UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/940,092	08/27/2001	Siegfried Kamlah	GR 00 P 16715	5991

24131 7590 01/18/2008
LERNER GREENBERG STEMER LLP
P O BOX 2480
HOLLYWOOD, FL 33022-2480

EXAMINER	
AU, SCOTT D	
ART UNIT	PAPER NUMBER
2612	

MAIL DATE	DELIVERY MODE
01/18/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES DEPARTMENT OF COMMERCE
U.S. Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
09/940,092	8/27/01	KAMLAH, SIEGFRIED	GR 00 P 16715

LERNER GREENBERG STEMER LLP
P O BOX 2480
HOLLYWOOD, FL 33022-2480

EXAMINER	
Scott Au	
ART UNIT	**PAPER**
2612	20080115

DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner for Patents

The English language translation of "DE 19718423A1, by Gold" is provided. The Suppplemental Examiner Answer of 10/29/06 has been vacated. This is to further acknowledged the receipt of the amended Brief (9/18/06) and the reply Brief (10/8/06). All substitutive issues have been previously addressed by the August 29, 2006 Examiner Answer. This case is being forwarded to the Board of Appeals.

BRIAN ZIMMERMAN
SUPERVISORY PATENT EXAMINER

Result Page

The invention relates to a portable signal receiver, in particular for a theft protective system of a motor vehicle.

A well-known signal receiver (DE 37 21 822 c1) is located on a smart card. As receiving antenna it exhibits a coil, whose turns lie in the level of the smart card. If such a signal receiver is used with a theft protective system for a motor vehicle, then still another Signalsender on the smart card is arranged. Thus both signals can be received to an identification unit sent and from this.

If a user liked to enter into his vehicle, then first by operation of a release means a question answer dialogue is released. Here a question signal inductive is sent over a magnetic field by a transmitting antenna in form of a coil in the motor vehicle to a signal receiver carried by the user. If this receives the question signal, then a response signal is produced, which is sent back to the motor vehicle. There the response signal is compared with a target signal and produced with agreement an enabling signal.

If the transmitting antenna in the vehicle and the antenna of the signal receiver are implemented as coils, then when heading for the coils with sinusoidal signals electromagnetic fields are produced. These fields induce a voltage in the coil of the signal receiver. So that the induced voltage is as large as possible, lines of flux in sufficient mass must intersperse the coil of the signal receiver.

▲ top

In the Fig. a magnetic field B is represented 5, which is produced by a coil (transmitting antenna 12), which is in the motor vehicle. Into this magnetic field a signal receiver is brought with its coil 13. Depending upon layer (direction of the level of the turns) of the coil 13, it is interspersed more or less strongly by the magnetic field (Magnetfeldlinien). A turn of the coil 13 encloses

thereby a surface, which is called in the following turn surface A.

The value of the voltage induced in the coil 13 of the signal receiver (for this proportional is the concatenated river PHI) depends among other things on an angle alpha (see. Fig. 6a to 6c), that the angle between the turn surface A (in the Fig. 6 is surface vectors A', which perpendicularly to the turn surface A, and river concatenation vectors PHI represented) the coil 13 of the signal receiver and the lines of flux of the magnetic field B produced by the transmitting antenna 12 in the motor vehicle is represented.

The voltage induced in the coil 13 of the signal receiver is largest, if the coil 13 is interspersed perpendicularly by the Magnetfeldlinien (Fig. 6a) and is very small, if it is in approximately parallel to the Magnetfeldlinien arranged (Fig. 6c). The height of the voltage depends besides on the effective turn surface A umschlossenen of the turns of the coil 13 of the signal receiver.

The dependence of the concatenated river PHI on the angle is clarified by the general well-known formula PHI = B.A.cos alpha.

Accordingly it can occur the fact that no or only a very small voltage in the coil 13 of the signal receiver is induced, if the coil 13 parallel to the lines of flux (alpha about 90 DEG - > cos alpha APPROX 0) is arranged (in accordance with coil 13 ' in the Fig. 5). If the coil 13 in their situation deviates from this parallel situation (see. Coil 13 " in Fig. 5), then the induced voltage becomes larger. If the coil 13 of the signal receiver against it is interspersed perpendicularly by the Magnetfeldlinien (alpha about 90 DEG - > cos alpha APPROX 1), then is induced the maximum voltage in the coil 1 (see. Coil 13 "' in Fig. 5).

Dependent on the situation of the coil 13 of the signal receiver a more or less large voltage in the coil is induced. In order to go around this problem, in an earlier application (DE 195 42 441) was suggested planning in the motor vehicle two closely together arranged coil aerials. The two coil aerials are out of phase headed for thereby so that moved back and forth magnetic field develops (see. Fig. 5, broken double arrow). The same effect was obtained, if the coil of the signal receiver is moved back and forth (see. Coils 13 ' and 13 " in Fig. 5).

However for this on the one hand a very high expenditure is necessary for the transmitting antenna in the motor vehicle. On the one hand two closely together arranged coil aerials will have needed and on the other hand the two coil aerials also still out of phase to each other to become. On the other hand the user would have move back and forth vorm entering into his motor vehicle the signal receiver, so that the question signal will receive surely.

The invention is the basis the problem to create a portable signal receiver that receives a signal independently of the angular position regarding a transmitting antenna reliably from the transmitting antenna, if he is arranged in the proximity of the transmitting antenna.

This problem is solved according to invention by the features from claim 1. The signal receiver exhibits three antennas in the form of coils, whose turn surfaces are perpendicularly to each other arranged in each case. If the signal receiver lies itself within the range of a transmitting antenna, then by the three-dimensional arrangement of the coils independently of the angular position of the signal receiver at least in one of the three coils a voltage is induced, which can be processed in the signal receiver.

Favourable arrangements of the invention are characterized by the Unteransprüche. So the coils can be trained as Luftspulen or as ferrite coil with a ferrite core. The ferrite cores can be einstückig manufactured, on which one or more coils are perpendicularly to each other rolled up in each case.

The coils can be arranged thereby on card-sizes a card or on a key handle of a conventional door key.

Embodiments of the invention are more near described in the following on the basis the schematic figures. Show:

Fig. 1 a plan view on a signal receiver according to invention,

Fig. 2 a further embodiment of a signal receiver,

Fig. 3a to 3c of embodiments for ferrite cores with wound coils,

Fig. 4 a block diagram of the signal receiver,

Fig. 5 a line of flux picture one by a transmitting antenna in a motor vehicle produced magnetic field and

Fig. 6a to 6c magnetic Flussverkettungen of a coil in the magnetic field in accordance with Fig. 5.

A portable signal receiver 1 (Fig. 1) preferably for a theft protective system of a motor vehicle one uses. It exhibits a mother board 2 and at least three receiving antennas in the form of coils Sx, systems and sp. The three coils Sx, systems and sp are connected with a receipt unit 3 electrical, which can be arranged as integrated semiconductor device on the mother board 2.

With use for a theft protective system first a question signal is sent with the help of an electromagnetic field by a not represented transmitting antenna for example in the door lining or in the outside mirrors of the motor vehicle. If the signal receiver 1 is arranged in the proximity of the transmitting antenna, then he receives the question signal over or several of the coils Sx, systems and sp, as a voltage in the coils is induced, which is dependent on the angular position

of the coils concerning the magnetic field. The question signal thereupon evaluated in the receipt unit 3.

So that user can prove its authorization (Authentifikation), still another transmission unit can be 4 on the mother board 2 arranged, after receipt of the question signal a response signal produced, which contains user or vehicle-specific code information. There the coils Sx, systems and sp also as transmission coils to be used know, the response signal over one or more coils a Sx, a system and sp to the motor vehicle are sent back. In addition, it can be arranged still another further transmitter, for example in form of a further coil on the mother board 2, with which the response signal is sent.

The response signal received there is evaluated in a controller. For this it is compared with an expected target signal (Authentifikation) and with at least large agreement of the two signals an enabling signal is produced, by which for example the doors of the motor vehicle unlocks (access control) or to ferries of the vehicle needed aggregate (electronic going away barrier) in the motor vehicle one releases.

Falls sich der Signalempfänger 1 in der Nähe einer Sendeantenne befindet, soll auf jeden Fall ein Fragesignal empfangen werden, und dies unabhängig von der Winkellage des Signalempfängers 1 in Bezug auf die Sendeantenne oder das von ihr erzeugte Magnetfeld. Therefore the coils Sx, systems and sp are in such a manner directed toward the signal receiver 1 ?three-dimensional? that their turn surfaces and thus its magnetic river vectors PHI in approximately in each case to each other stand perpendicularly. Thus each coil Sx, system and sp exhibits one prefers pronounced receipt characteristic into another direction in space.

The coil sp is wound with the first embodiment with their turns in the level of the mother board 2 (the Windungssinn is thereby in the Fig. 1 by the circulating arrow indicated), so that their magnetic river vector PHI z into the indication level of Fig. 1 goes in (this is to correspond to the Z-axis of a cartesian coordinate system). The second coil system is in such a manner wound on a ferrite core 5 that its magnetic river vector PHI y in the Fig. 1 points upward (this corresponds to the y axis of the cartesian coordinate system). The third coil Sx is likewise in such a way wound on a ferrite core 6 that its magnetic river vector PHI x in the Fig. 1 shows to the right (this corresponds to the x axis of the cartesian coordinate system)
Thus the magnetic river vectors PHI x, PHI y and PHI z of the three coils Sx, systems and sp lie in for instance in the three axles cartesian of the coordinate system. The turn surfaces of the three coils Sx, systems and sp lie perpendicularly in each case to the three axles cartesian of the coordinate system. Consequently magnetic field components Bx, By and Bz of the spatial magnetic field produced by the transmitting antenna induce a voltage in respectively according to arranged coil the Sx, systems or sp. The height of the voltage induced in each case depends however on the angular position of the respective coil Sx, system and sp to the respective magnetic field component Bx, By and/or. Bz and their value (see. also Fig. 6a to 6c).

The coils Sx, systems and sp can be arranged thereby distributed and spatial separately from each other on the mother board 2. Likewise it is possible that the coils Sx, systems and sp are wound as closely as possible together however also in standing turn surfaces approximately perpendicularly to each other. This becomes with the embodiment after Fig. 2 represented. The coils Sx and systems on a ferrite core 7 are rolled up, which is trained cross-shaped with pole shoes of 8 at the ends its thighs. The coils Sx and systems are diagonally in each case perpendicularly to the thighs of the ferrite core 7 and thus to each other wound (perpendicularly in each case to the indication level). The coil sp is about circularly wound on the pole shoes 8 of the ferrite core 7. Its turn surface A is parallel thereby to the indication level. Thus the turn surfaces of the three coils Sx, systems and sp are in each case perpendicularly to each other arranged about.

The embodiment of the signal receiver 1 after Fig. 2 is very small in his dimensions. The coils Sx, systems and sp are arranged thereby on closest area. Thus such a signal receiver 1 can be built well into casings with small dimensions.

The coil sp is in the Fig. 1 as Luftspule and in the Fig. 2 only partly than ferrite coil trained. With a Luftspule that is not filled inside of the coil with a magnetically conductive material.

The coil sp is directly applied on the mother board 2. It can consist for example of conductors, which are spulenförmig fastened on the mother board 2, for example in slots. Likewise the mother board can be trained 2 as printed circuit board and the coil sp with their turns in the form of conductive strips. The mother board can be provided with ferrite material in the range of the turn surface of the coil sp, whereby its quality/ouple factor is increased.

The coils Sx and systems are in the Fig. 1 and 2 as ferrite coils trained, with which the turns are wound on a ferrite core 5, 6, 7. The inside of the coils Sx and systems is then thus to a large extent filled out with a material with very high relative permeability mu r. By a ferrite core as well known the magnetic river becomes PHI amplified. Consequently can be made smaller with same effect of the diameters of the turns (and thus the turn surface) of the coils Sx, system and sp, if the coils are wound on a ferrite core.

Into the Fig. 3a to 3c are represented further embodiments for the coils Sx and systems and their ferrite cores 5, 6 or 7. The ferrite cores 5, 6 or 7 can be einstückig trained in approximately cross-shaped thereby. In addition, each coil Sx and system can exhibit their own ferrite core 5, 6, in approximately perpendicularly then in each case to the ferrite core the other coil - z. T. superimposedly as in Fig. 3c - is arranged.

If the coil sp particularly largely (D. h. high ouple factor or large quality, like z. B. when Luftspule with large turn diameter or as large ferrite coil with a ferrite material with high permeability) it is trained then this has the advantage that with the receipt of the electromagnetic field also energy will receive can. If no energy storage on the mother board 2 is arranged or if

this energy storage is empty, then alone the received energy can be sufficient, in order to evaluate the question signal and to produce as well as send the response signal if necessary. Thus then such, particularly pronounced coil serves a fail-safe function for carrying out with gun-out of battery.

The energy can be received also over a separate, not represented coil. If this coil with a special high ouple factor and/or a good quality is out-arranged, then the power transmission is particularly effective.

The three coils Sx, systems and sp are connected all with the receipt unit 3 and with the transmission unit 4 (Fig. 4). In each coil Sx, system and sp produced voltage for itself in own amplifiers 9 amplified and a common adder the 10 one supplies in each case. In the adder 10 the induced voltages are added due to the spatial magnetic field components Bx, By and Bz.

Instead of the adder 10 also a not represented maximum detector can be intended, only the largest of the voltage induced in the coils Sx, systems and sp for evaluation passes on. Thus unwanted, smaller magnetic fields for the evaluation are suppressed (transhorizon range avoidance).

If in or two of the three coils Sx, system or sp a too small voltage are induced, then still the third coil remains, in which due to the spatial magnetic field and the three-dimensional arrangement of the coils Sx, system and sp a larger voltage are induced, if the signal receiver 1 is in the proximity of the transmitting antenna and thus within the magnetic field.

The coils Sx, systems and sp are trained from their dimensions so small that the mother board 2 with the coils Sx, system and sp fits on a small flat card in form of a cheque card (also Smart Card one calls). The mother board 2 can be trained also in such a manner small that it can be fastened with the coils Sx, systems and sp on a key handle of a mechanical door/ignition key. Thus the signal receiver 1 can be carried comfortably by the user with itself.

The signal receiver 1 can be arranged also in other, functional equivalent casings. For the invention the form of the casing is insignificant. Substantially however it is that the coils Sx, systems and sp are perpendicularly to each other arranged in each case and are very small trained in their dimensions.

Since the three coils Sx, systems and sp are arranged in approximately into all three directions in space x, y and z, it does not depend on the angular position of the signal receiver 1 concerning the transmitting antenna. The user can carry thus its signal receiver 1 both in one of his bags or in a handbag with itself. The signal receiver 1 can be put down also in the vehicle into a subject. As long as the signal receiver 1 is within the range of the transmitting antenna and a sufficient large magnetic field produces the transmitting antenna, with the signal receiver according to invention 1 the question signal is received surely.

If additionally still another transmission unit 4 is intended, then the transmission unit 4 can send a response signal back to receipt of the question signal. Thus a Authentifikation is accomplished. If the Authentifikation is successful, D. h. if the response signal turns out as justified, then door locks can be en or unlocked or be loosened a going away barrier in the motor vehicle.

The signal receiver 1 cannot only be used with theft protective systems for motor vehicles. It can be used everywhere, where a signal is sent by a transmitting antenna over a magnetic field inductive and from the portable signal receiver 1 will receive is. Binary information which can be transmitted is transmitted thereby modulated with the help of the magnetic field. With the receipt of the signal the binary information is demodulated and evaluated.

The range of inductive transferred signals amounts to about 1 to 2 M. The range depends on the transmitter frequency, which amounts to with uses on the field of the automotive engineering preferably 125 kHz. The range depends also on the transmitting power and the directional characteristic of the transmitting antenna. The response signal is sent for example with a transmitter frequency by 433 MHz back to the motor vehicle. Here the range can be substantially larger.

The ferrites can of pure magnetic materials (connections of iron (- oxides) and manganese, nickel or zinc oxides) or also of a plastic consist, into which ferromagnetic particles are brought (Plastoferrite). Ferrite cores consist of ferrites and can be manufactured very thinly as punching hurry. Thus the thickness of a coil wound on a ferrite core can lie within the range of 1 to 2 mm. The length of the thighs of the ferrites can lie in the cm range. Thus small designs can be realized, which take only small place on the mother board 2.

If the signal receiver 1 on a Smart Card is arranged, then he can be preferably carried in the shirt or trouser pocket of the user. Just as it can easily in a handbag o. A. are carried forward.

Dependent on a preferred direction, into which the magnetic field produced by the transmitting antenna is arranged, and on an advantages angle situation of the signal receiver 1 then that coil Sx, system or sp, which are interspersed during this preferred direction mainly by the magnetic field, can be characteristically trained special. So this coil Sx, system or sp with their turns can receive a larger turn diameter (larger turn surface). Likewise the permeability can be increased by a hochpermeablen ferrite core. The number of turns of the coil Sx, system or sp can be likewise increased. By this additional expenditure it is then more probable that a signal with a sufficient starch will receive 1 from the signal receiver, if the signal receiver 1 is within the range of the transmitting antenna and sends this also a signal.

It is sufficient, if the signal receiver can receive 1 signals. It is favourable for the use with a theft protective system of a motor vehicle, if additionally still another transmission unit 4 is intended, which sends a response signal back to receipt question signal. There the coils Sx, systems and sp both signals received and which can send, the signal receiver 1 can be together with the

transmission unit 4 a transponder, which causes a producing of the response signal by the receipt of the question signal.

Result Page

1. Portable signal receiver with a receipt unit (3), which an inductive transferred signal over an antenna receives, characterised in that it three antennas in the form of coils (Sx, systems and sp) exhibits, their turn surfaces about are in each case perpendicularly to each other arranged.

2. Signal receivers according to claim 1, characterised in that the coils (Sx, systems and sp) as Luftspulen or as ferrite coils are trained.

3. Signal receiver according to claim 1, characterised in that inside the coils (Sx, system and sp) a ferrite core (5, 6; 7) is arranged.

4. Signal receiver according to claim 3, characterised in that the ferrite core (of 7) two cross-shaped thighs exhibits, around which two of the coils (Sx, systems and sp) are perpendicularly to each other wound.

5. Signal receiver after one of the preceding claims, characterised in that it a mother board (2) exhibits, those is and on that the coils (Sx, systems and sp) about scheckkartenförmig trained and the receipt unit (3) are arranged.

6. Signal receiver after one of the claims 1 to 3, characterised in that the mother board (2) on a key handle is arranged.

▲ top

7. Signal receiver after one of the preceding claims, characterised in that it beside the receipt unit (3) still another transmission unit (4) exhibits and for a theft protective system for a motor vehicle is used.